

AMENDMENTS TO THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims

1.-34. (Canceled)

35. (Currently amended) A method for determining an endpoint indicator in plasma processing, the method comprising:

providing a signal having a frequency;

etching, in a plasma processing chamber, at least one sample substrate using the signal;

determining at least one calibrating endpoint by performing an empirical analysis on the at least one sample substrate;

etching, in the plasma processing chamber, at least one test substrate using one or more signals having the frequency, the at least one test substrate being etched for over at least one time duration, the at least one time duration including beyond the at least one calibrating endpoint;

measuring a plurality of parameters over at least one time range ~~when etching the at least one test substrate~~, the at least one time range including the at least one calibrating endpoint, ~~at least a start point of the at least one time range is delayed relative to at least started later than~~ a start point of the at least one time duration;

comparing data pertaining to at least a plurality of harmonics for the plurality of parameters, the plurality of harmonics representing harmonics of the frequency, the data pertaining to at least sensitivity of the plurality of harmonics for the plurality of parameters responsive to the at least one calibrating endpoint; and

selecting the endpoint indicator based on the comparing, the endpoint indicator including a selected harmonic for a select parameter of said plurality of parameters.

36. (Previously presented) The method of claim 35 wherein the at least one time range ends earlier than the at least one time duration and forms a time window around an expected endpoint, the expected endpoint determined based on the at least one calibrating endpoint.

37. (Canceled).

38. (Previously Presented) The method of claim 35 wherein the empirical analysis includes a scanning electron microscopy analysis.

39. (Previously Presented) The method of claim 35 wherein the select parameter represents one of current, voltage, and phase.

40. (Canceled).

41. (Previously Presented) The method of claim 35 wherein the select parameter is measured at one or more of an upper electrode and a lower electrode of a system for the plasma processing.

42. (Previously Presented) The method of claim 35 wherein the select parameter is measured at both of an upper electrode and a lower electrode of a system for the plasma processing.

43. (Canceled).

44. (Previously Presented) The method of claim 35 further comprising verifying the endpoint indicator by performing a further empirical analysis.

45. (Currently amended) A method for detecting an endpoint in plasma processing that employs a signal having a frequency, the method comprising:
etching at least one sample substrate using at least one signal having the frequency;

determining a calibrating endpoint by performing an empirical analysis on at least one etched location of the at least one sample substrate;

etching at least one test substrate using one or more signals having the frequency, the at least one test substrate being etched ~~for over~~ at least one time duration, the at least one time duration including beyond the calibrating endpoint;

measuring a plurality of parameters over a time range when processing the at least one test substrate, the time range including the calibrating endpoint;

comparing data pertaining to a plurality of harmonics of the frequency for the plurality of parameters, the data pertaining to the calibrating endpoint;

selecting a harmonic of the frequency for a parameter from the plurality of harmonics of the frequency for the plurality of parameters as an endpoint indicator based on the comparing, wherein a signal representing the harmonic of the frequency for the parameter is selected from a plurality of signals representing the plurality of harmonics of the frequency for the plurality of parameters as having the most repeatable response pertaining to the calibrating end point;

setting at least one criterion pertaining to the harmonic of the frequency for the parameter for indicating the endpoint;

etching a production substrate at the frequency;

determining a time window around an expected endpoint, the expected endpoint determined based on the calibrating endpoint, a length of the time window being less than a length of the at least one time duration;

monitoring the harmonic of the frequency for the parameter within the time window when etching the production substrate; and

signaling the endpoint when the at least one criterion is met.

46. (Previously presented) The method of claim 45 wherein the parameter represents one of current, voltage, and phase.

47. (Previously presented) The method of claim 45 wherein the at least one criterion includes presence of a trough in a waveform of the harmonic of the frequency for the parameter.

48. (Previously presented) The method of claim 45 wherein the monitoring includes measuring the parameter at one or more of an upper electrode and a lower electrode of a system for the plasma processing.
49. (Previously presented) The method of claim 45 wherein the monitoring includes measuring the parameter at both of an upper electrode and a lower electrode of a system for the plasma processing.
50. (Previously presented) The method of claim 45 wherein the monitoring is not performed before the time window.